Question	Answer	Solution
12.	$(-2, -3)$	$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ $\left(\frac{-3 + (-1)}{2}, \frac{-7 + 1}{2}\right) = \left(\frac{-4}{2}, \frac{-6}{2}\right)$ $= (-2, -3)$
13.	$\left(3\frac{1}{2}, -4\frac{1}{2}\right)$	$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ $\left(\frac{12 + (-5)}{2}, \frac{-7 + (-2)}{2}\right) = \left(\frac{7}{2}, \frac{-9}{2}\right)$ $= \left(3\frac{1}{2}, -4\frac{1}{2}\right)$
14.	$(17, -23)$	**Step 1** Let coords. of R equal (x, y). **Step 2** Use Mdpt. Formula. $(7, -9) = \left(\frac{-3 + x}{2}, \frac{5 + y}{2}\right)$ **Step 3** Find x-coord. Find y-coord. $7 = \frac{-3 + x}{2}$ $-9 = \frac{5 + y}{2}$ $14 = -3 + x$ $-18 = 5 + y$ $x = 17$ $y = -23$ The coordinates of R are $(17, -23)$.
15.	$(8, 4)$	**Step 1** Let coords. of C equal (x, y). **Step 2** Use Mdpt. Formula. $\left(2\frac{1}{2}, 1\right) = \left(\frac{x + (-3)}{2}, \frac{y + (-2)}{2}\right)$ **Step 3** Find x-coord. Find y-coord. $2\frac{1}{2} = \frac{x + (-3)}{2}$ $1 = \frac{y + (-2)}{2}$ $5 = x - 3$ $2 = y - 2$ $x = 8$ $y = 4$ The coordinates of C are $(8, 4)$.

Question	Answer	Solution
16.	$2\sqrt{5}$; $2\sqrt{5}$; yes	**Step 1** Find coords. of each point. $D(-4, 0)$, $E(0, -2)$, $F(2, 3)$, and $G(4, -1)$. **Step 2** Use Dist. Formula. $DE = \sqrt{(0-(-4))^2 + (-2-0)^2}$ $= \sqrt{4^2 + (-2)^2}$ $= \sqrt{16+4} = \sqrt{20} = 2\sqrt{5}$ $FG = \sqrt{(4-2)^2 + (-1-3)^2}$ $= \sqrt{2^2 + (-4)^2}$ $= \sqrt{4+16} = \sqrt{20} = 2\sqrt{5}$ Since $DE = FG$, $\overline{DE} \cong \overline{FG}$.
17.	$2\sqrt{5}$; $\sqrt{29}$; no	**Step 1** Find coords. of each point. $D(-4, 0)$, $E(0, -2)$, $R(-3, -4)$, and $S(2, -2)$. **Step 2** Use Dist. Formula. $DE = \sqrt{(0-(-4))^2 + (-2-0)^2}$ $= \sqrt{4^2 + (-2)^2}$ $= \sqrt{16+4} = \sqrt{20} = 2\sqrt{5}$ $RS = \sqrt{(2-(-3))^2 + (-2-(-4))^2}$ $= \sqrt{5^2 + 2^2}$ $= \sqrt{25+4} = \sqrt{29}$ Since $DE \neq RS$, $\overline{DE} \not\cong \overline{RS}$.
19.	8.9	**Method 1** Dist. Formula. $MN = \sqrt{(2-10)^2 + (-5-(-1))^2}$ $= \sqrt{(-8)^2 + (-4)^2}$ $= \sqrt{64+16} = \sqrt{80} \approx 8.9$ **Method 2** Pyth. Thm. Count the units for the legs of the rt. $\triangle$ formed by M and N. $a = 8$ and $b = 4$ $c^2 = a^2 + b^2$ $= 8^2 + 4^2$ $= 64 + 16 = 80$ $c = \sqrt{80} \approx 8.9$

Question	Answer	Solution
20.	15.5	**Method 1** Dist. Formula. $PQ = \sqrt{(5-(-10))^2 + (5-1)^2}$ $= \sqrt{15^2 + 4^2}$ $= \sqrt{225 + 16} = \sqrt{241} \approx 15.5$ **Method 2** Pyth. Thm. Count the units for the legs of the rt. $\triangle$ formed by P and Q. $a = 15$ and $b = 4$ $c^2 = a^2 + b^2$ $= 15^2 + 4^2$ $= 225 + 16 = 241$ $c = \sqrt{241} \approx 15.5$
22.	$\overline{CD}$, $\overline{EF}$, $\overline{AB}$	**Step 1** Find coords. of each point. $A(-4, 2)$, $B(1, 4)$, $C(2, 5)$, $D(4, 1)$, $E(-2, -2)$, and $F(3, -1)$. **Step 2** Use Dist. Formula. $AB = \sqrt{(1-(-4))^2 + (4-2)^2}$ $= \sqrt{5^2 + 2^2}$ $= \sqrt{25 + 4} = \sqrt{29}$ $CD = \sqrt{(4-2)^2 + (1-5)^2}$ $= \sqrt{2^2 + (-4)^2}$ $= \sqrt{4 + 16} = \sqrt{20}$ $EF = \sqrt{(3-(-2))^2 + (-1-(-2))^2}$ $= \sqrt{5^2 + 1^2}$ $= \sqrt{25 + 1} = \sqrt{26}$ $\overline{CD}$, $\overline{EF}$, $\overline{AB}$
24.	$\left(-2a, \frac{3}{2}a\right)$	$\left(\frac{a + (-5a)}{2}, \frac{3a + 0}{2}\right) = \left(\frac{-4a}{2}, \frac{3a}{2}\right)$ $= \left(-2a, \frac{3}{2}a\right)$
25.	Divide each coord. by 2.	Divide each coord. by 2.
26.	6.1 mi	Coords. of Cedar City are (2, 3). Coords. of Milltown are (3, −3). Dist. $= \sqrt{(3-2)^2 + (-3-3)^2}$ $= \sqrt{1^2 + (-6)^2}$ $= \sqrt{37} \approx 6.1$ mi

Question	Answer	Solution
29.	Possible answer: seg. with end pts. (1, 2) and (—1, —2)	Possible answer: seg. with endpts. (1, 2) and (—1, —2)
30.	14.5	**Step 1** Find *AB*, *BC*, and *AC*. $AB = \sqrt{(-2-1)^2 + (-1-4)^2}$ $= \sqrt{(-3)^2 + (-5)^2}$ $= \sqrt{9+25} = \sqrt{34}$ $BC = \sqrt{(-3-(-2))^2 + (-2-(-1))^2}$ $= \sqrt{(-1)^2 + (-1)^2}$ $= \sqrt{1+1} = \sqrt{2}$ $AC = \sqrt{(-3-1)^2 + (-2-4)^2}$ $= \sqrt{(-4)^2 + (-6)^2}$ $= \sqrt{16+36} = \sqrt{52}$ **Step 2** Find perimeter. $P = AB + BC + AC$ $= \sqrt{34} + \sqrt{2} + \sqrt{52} \approx 14.5$
31.	1	$A = \frac{1}{2}bh$ $= \frac{1}{2}(BC)(\sqrt{2})$ $= \frac{1}{2}(\sqrt{2})(\sqrt{2})$ $= \frac{1}{2}(2) = 1$ square unit
32.	When 2 pts. lie on a horiz. or vert. line, they share a common *x*—coordinate or *y*—coordinate. To find the dist. between the pts., find the difference of the other coordinates.	When 2 pts. lie on a horiz. or vert. line, they share a common y—coord. or x—coord. To find the dist. between the pts., find the difference of the other coords.
33.	Let M be the mdpt. of $\overline{AC}$; $AM = MC = 5.0$ ft; $MB = MD \approx 6.4$ ft.	Let M be the mdpt. of $\overline{AC}$. $AM = MC = \frac{1}{2}(10) = 5.0$ ft $MB = MD = \sqrt{5^2 + 4^2} = \sqrt{41} \approx 6.4$ ft